



# LITEMAX DLF/DLH1825

## Sunlight Readable 18.5" LED B/L LCD

### User Manual

(1st Edition 2011/11/14 )  
All information is subject to change without notice.

| Approved by | Checked by | Prepared by |
|-------------|------------|-------------|
|             |            |             |

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**RECORD OF REVISION**

| Version and Date | Page | Old Description | New Description | Remark |
|------------------|------|-----------------|-----------------|--------|
| Nov,14,2011      | all  |                 | Initial Release |        |
|                  |      |                 |                 |        |
|                  |      |                 |                 |        |
|                  |      |                 |                 |        |

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## 1.0 GENERAL DESCRIPTION

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DLF/DLH1825 is 18.5" wide color a-Si TFT-LCD module as active switching devices with 1,000nits LED backlight powered by Durapixel™ technology. This module has a 18.5 inch diagonally measured active area with WXGA resolutions (1366\* 768). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.

### 1.1 FEATURES

- Sunlight Readable
- LED Backlight
- High Shock & Vibration Resistance
- Low Power Consumption
- High Uniformity
- Low EMI Noise
- Wide Dimming

### 1.2 APPLICATION

- Out/Indoor Display
- Out/Indoor Digital Signage
- Quick Service Restaurant Display Product
- Transportation

### 1.3 GENERAL SPECIFICATIONS

|                                |                                                  |
|--------------------------------|--------------------------------------------------|
| <b>Description</b>             | 18.5" Wide TFT LCD, LED Backlight 1000nits, WXGA |
| <b>Display Area (mm)</b>       | 409.8(h) x 230.4(v) mm                           |
| <b>Brightness</b>              | 1000 cd/m <sup>2</sup>                           |
| <b>Resolution</b>              | 1366x768 (WXGA)                                  |
| <b>Contrast Ratio</b>          | 1000 : 1                                         |
| <b>Pixel Pitch (mm)</b>        | 0.3(H) x 0.3(V)                                  |
| <b>Viewing Angle</b>           | +85°~-85°(H), +80°~-80°(V)                       |
| <b>Display Colors</b>          | 16.7M                                            |
| <b>Response Time (Typical)</b> | 5ms                                              |
| <b>Sync</b>                    | LVDS                                             |
| <b>Power Consumption</b>       | 24W                                              |
| <b>Dimensions (mm)</b>         | 430.37x254.6x13.8                                |
| <b>Weight (Net)</b>            | 1.6Kg                                            |

## 2.0 ELECTRICAL CHARACTERISTICS

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### 2.1 ELECTRICAL CHARACTERISTICS

Control circuit driving

| Item                               | Symbol  | Conditions               | MIN.  | TYP.  | MAX.  | Unit | Remark |
|------------------------------------|---------|--------------------------|-------|-------|-------|------|--------|
| Input Voltage                      | Vin     |                          | 10.0  | 12.0  | 14.0  | V    |        |
| Input Current<br>(Low Brightness)  | IinL    | VIN=12V,Vadj=5V          | 3     | ----- | ----- | mA   |        |
| Input Current<br>(High Brightness) | IinH    | VIN=12V,Vadj=0V          | 1.83  | 1.52  | 1.29  | A    |        |
| LED Current<br>(Low Brightness)    | IoutL   | VIN=12V,Vadj=5V          | 0.0   | ----- | ----- | Arms |        |
| LED Current<br>(High Brightness)   | IoutH   | VIN=12V,Vadj=0V          | 0.83  | 0.83  | 0.83  | A    |        |
| Working Frequency                  | Freq    | VIN=12V,Vadj=0V          | 523   | 550   | 580   | KHz  |        |
| PWM Frequency                      | Freq    | VIN=12V                  | 180   | 200   | 220   | HZ   |        |
| Brightness Control                 | Vadj    | Connection of<br>Voltage | 0.5   | ----- | 4.8   | V    |        |
| ON/OFF Control                     | Von/off | Normal Operation         | 2     | ----- | 5     | V    |        |
| Output Voltage                     | Vout    | VIN=12V,Vadj=0V          | 20.62 | 20.62 | 20.62 | V    |        |
| Efficiency                         | $\eta$  | VIN=12V,Vadj=0V          | 93.52 | 93.83 | 94.77 | %    |        |

## 2.2 ABSOLUTE RATINGS OF ENVIRONMENT

High temperature or humidity may reduce the performance of panel. Please store LCD panel within the specified storage conditions.

Storage Condition: With packing.

Storage temperature range: 25±5 °C.

Storage humidity range: 50±10%RH.

Shelf life: 30days

## 2.3 ELECTRICAL ABSOLUTE RATINGS

| Item                 | Symbol          | Value |      | Unit | Note |
|----------------------|-----------------|-------|------|------|------|
|                      |                 | Min   | Max  |      |      |
| Power Supply Voltage | V <sub>CC</sub> | -0.3  | +6.0 | V    | (1)  |

Note (1) Permanent damage might occur if the module is operated at conditions exceeding the maximum values.

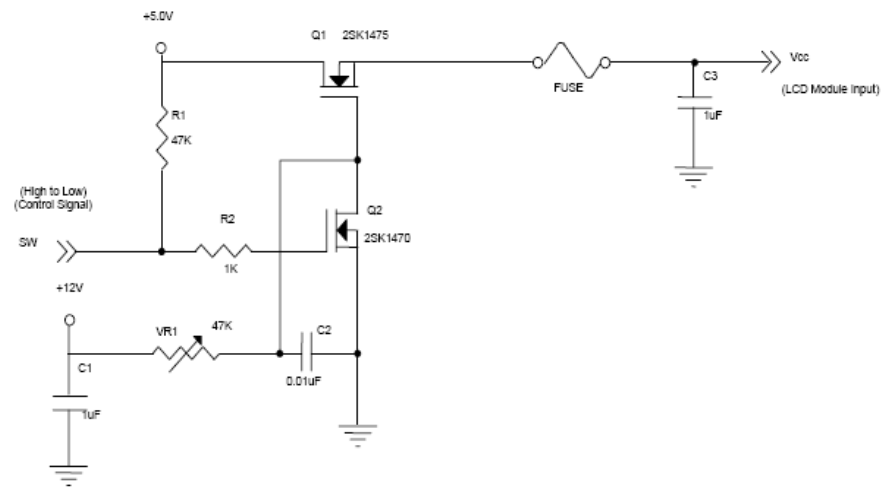
## 2.4 TFT LCD

Ta = 25 ± 2 °C

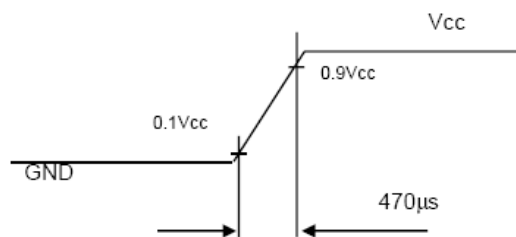
| Parameter                       |                 | Symbol            | Value           |      |      | Unit | Note |
|---------------------------------|-----------------|-------------------|-----------------|------|------|------|------|
|                                 |                 |                   | Min.            | Typ. | Max. |      |      |
| Power Supply Voltage            |                 | V <sub>CC</sub>   | 4.5             | 5.0  | 5.5  | V    | -    |
| Ripple Voltage                  |                 | V <sub>RP</sub>   | -               | -    | 100  | mV   | -    |
| Power On Rush Current           |                 | I <sub>RUSH</sub> | -               | -    | 3    | A    | (2)  |
| Power Supply Current            | White           | -                 | -               | 0.44 | 0.6  | A    | (3)a |
|                                 | Black           |                   | -               | 0.58 | 0.9  | A    | (3)b |
|                                 | Vertical Stripe |                   | -               | 0.6  | 0.9  | A    | (3)c |
| Power Consumption               |                 | P <sub>LCD</sub>  | -               | 6    | -    | Watt | (4)  |
| LVDS differential input voltage |                 | V <sub>id</sub>   | 100             | -    | 600  | mW   | -    |
| LVDS common input voltage       |                 | V <sub>ic</sub>   | -               | 1.2  | -    | V    | -    |
| Logic "L" input voltage         |                 | V <sub>il</sub>   | V <sub>SS</sub> | -    | 0.8  | V    | -    |

Note (1) The module should be always operated within above ranges.

Note (2) Power On Rush Current Measurement Conditions: (must follow power sequence)



**Vcc rising time is 470μs**



Note (3) The specified power supply current is under the conditions at  $V_{cc} = 5.0\text{ V}$ ,  $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$ ,  $F_v = 60\text{ Hz}$ , whereas a power dissipation check pattern below is displayed.

a. White Pattern



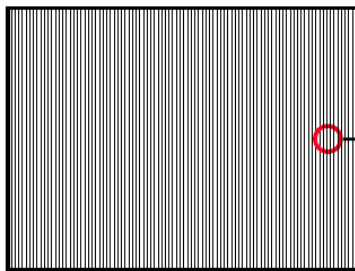
Active Area

b. Black Pattern

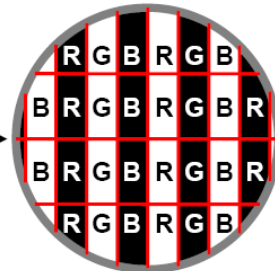


Active Area

c. Vertical Stripe Pattern

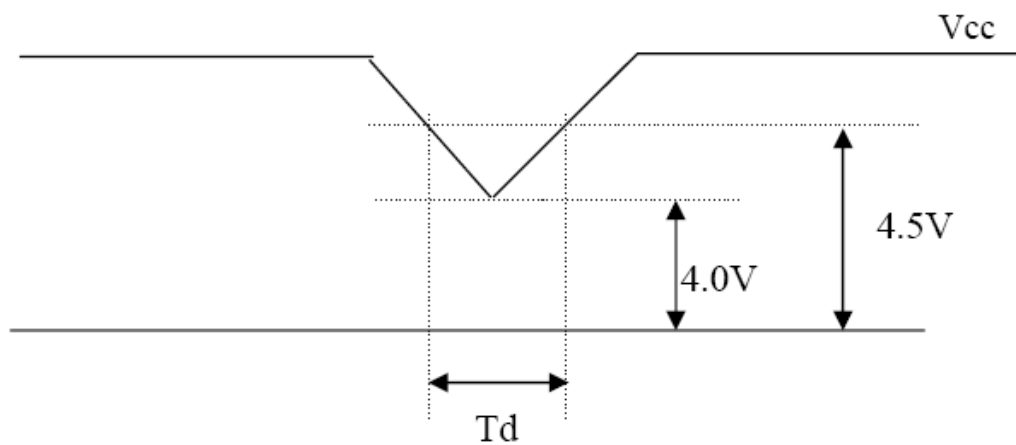


Active Area



Note (4) The power consumption is specified at the pattern with the maximum current.

## 2.5 $V_{cc}$ POWER DIP CONDITION:



Dip condition:  $4.0V \leq V_{cc} \leq 4.5V, T_d \leq 20ms$

## 2.6 TFT LCD

| Pin | Name   | Description                                      |
|-----|--------|--------------------------------------------------|
| 1   | NC     | Not connection, this pin should be open.         |
| 2   | NC     | Not connection, this pin should be open.         |
| 3   | NC     | Not connection, this pin should be open.         |
| 4   | GND    | Ground                                           |
| 5   | RX0-   | Negative LVDS differential data input. Channel 0 |
| 6   | RX0+   | Positive LVDS differential data input. Channel 0 |
| 7   | GND    | Ground                                           |
| 8   | RX1-   | Negative LVDS differential data input. Channel 1 |
| 9   | RX1+   | Positive LVDS differential data input. Channel 1 |
| 10  | GND    | Ground                                           |
| 11  | RX2-   | Negative LVDS differential data input. Channel 2 |
| 12  | RX2+   | Positive LVDS differential data input. Channel 2 |
| 13  | GND    | Ground                                           |
| 14  | RXCLK- | Negative LVDS differential clock input.          |
| 15  | RXCLK+ | Positive LVDS differential clock input.          |
| 16  | GND    | Ground                                           |
| 17  | RX3-   | Negative LVDS differential data input. Channel 3 |
| 18  | RX3+   | Positive LVDS differential data input. Channel 3 |
| 19  | GND    | Ground                                           |
| 20  | NC     | Not connection, this pin should be open.         |
| 21  | NC     | Not connection, this pin should be open.         |
| 22  | NC     | Not connection, this pin should be open.         |
| 23  | GND    | Ground                                           |
| 24  | GND    | Ground                                           |
| 25  | GND    | Ground                                           |
| 26  | Vcc    | +5.0V power supply                               |
| 27  | Vcc    | +5.0V power supply                               |
| 28  | Vcc    | +5.0V power supply                               |
| 29  | Vcc    | +5.0V power supply                               |
| 30  | Vcc    | +5.0V power supply                               |

Note (1) Connector Part No.: STM MSAKT2407P30A or equivalent.

## 2.7 LVDS DATA MAPPING TABLE

|                |             |     |     |     |     |     |     |     |
|----------------|-------------|-----|-----|-----|-----|-----|-----|-----|
| LVDS Channel 0 | LVDS output | D7  | D6  | D4  | D3  | D2  | D1  | D0  |
|                | Data order  | G0  | R5  | R4  | R3  | R2  | R1  | R0  |
| LVDS Channel 1 | LVDS output | D18 | D15 | D14 | D13 | D12 | D9  | D8  |
|                | Data order  | B1  | B0  | G5  | G4  | G3  | G2  | G1  |
| LVDS Channel 2 | LVDS output | D26 | D25 | D24 | D22 | D21 | D20 | D19 |
|                | Data order  | DE  | NA  | NA  | B5  | B4  | B3  | B2  |
| LVDS Channel 3 | LVDS output | D23 | D17 | D16 | D11 | D10 | D5  | D27 |
|                | Data order  | NA  | B7  | B6  | G7  | G6  | R7  | R6  |

## 2.8 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

| Color               |                 | Data Signal |    |    |    |    |    |    |    |       |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
|---------------------|-----------------|-------------|----|----|----|----|----|----|----|-------|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|
|                     |                 | Red         |    |    |    |    |    |    |    | Green |    |    |    |    |    |    |    | Blue |    |    |    |    |    |    |    |
|                     |                 | R7          | R6 | R5 | R4 | R3 | R2 | R1 | R0 | R7    | R6 | G5 | G4 | G3 | G2 | G1 | G0 | R7   | R6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors        | Black           | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red             | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green           | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Blue            | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Cyan            | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Magenta         | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Yellow          | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | White           | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Gray Scale Of Red   | Red(0) / Dark   | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red(1)          | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red(2)          | 0           | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | Red(253)        | 1           | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red(254)        | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red(255)        | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Gray Scale Of Green | Green(0) / Dark | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green(1)        | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green(2)        | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | Green(253)      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green(254)      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green(255)      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Gray Scale Of Blue  | Blue(0) / Dark  | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Blue(1)         | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 1  |
|                     | Blue(2)         | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 1  | 0  | 0  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | Blue(253)       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 0  | 1  |
|                     | Blue(254)       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 0  |
|                     | Blue(255)       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |

Note (1) 0: Low Level Voltage, 1: High Level Voltage

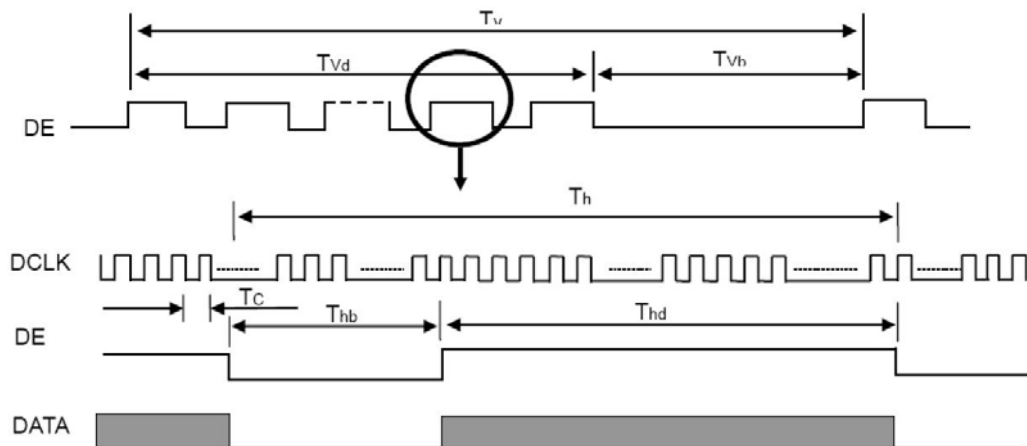
## 2.9 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

| Signal                         | Item       | Symbol | Min.   | Typ. | Max.   | Unit | Note       |
|--------------------------------|------------|--------|--------|------|--------|------|------------|
| LVDS Clock                     | Frequency  | Fc     | 50     | 76   | 95     | MHz  | -          |
|                                | Period     | Tc     | 10.5   | 13.2 | 20     | ns   | -          |
|                                | High Time  | Tch    | -      | 4/7  | -      | Tc   | -          |
|                                | Low Time   | Tcl    | -      | 3/7  | -      | Tc   | -          |
| LVDS Data                      | Setup Time | Tlvs   | 600    | -    | -      | ps   | -          |
|                                | Hold Time  | Tlvh   | 600    | -    | -      | ps   | -          |
| Vertical Active Display Term   | Frame Rate | Fv     | 40     | 60   | 75     | Hz   | -          |
|                                | Total      | Tv     | 266    | 294  | 376    | Th   | Tv=Tvd+Tvb |
|                                | Display    | Tvd    | 256    | 256  | 256    | Th   | -          |
|                                | Blank      | Tvb    | Tv-Tvd | 38   | Tv-Tvd | Th   | -          |
| Horizontal Active Display Term | Total      | Th     | 1446   | 1560 | 1936   | Tc   | Th=Thd+Thb |
|                                | Display    | Thd    | 1366   | 1366 | 1366   | Tc   | -          |
|                                | Blank      | Thb    | Th-Thd | 194  | Th-Thd | Tc   | -          |

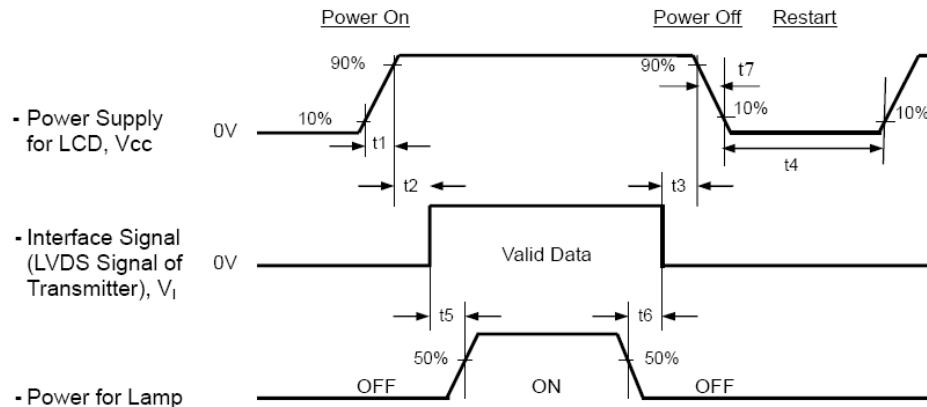
Note: Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

### INPUT SIGNAL TIMING DIAGRAM



## 2.10 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



### Timing Specifications:

- $0.5 < t_1 \leq 5 \text{ msec}$
- $0 < t_2 \leq 50 \text{ msec}$
- $0 < t_3 \leq 50 \text{ msec}$
- $t_4 \geq 500 \text{ msec}$
- $t_5 \geq 450 \text{ msec}$
- $t_6 \geq 90 \text{ msec}$
- $5 \leq t_7 \leq 100 \text{ msec}$

### Note.

- (1) The supply voltage of the external system for the module input should be the same as the definition of V<sub>cc</sub>.
- (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.
- (3) In case of VCC = off level, please keep the level of input signals on the low or keep a high impedance.
- (4) T4 should be measured after the module has been fully discharged between power off and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.
- (6) The company will not guarantee or compensate for the product damage caused by not following the Power Sequence.

### 3.0 OPTICAL CHARACTERISTICS

#### 3.1 TEST CONDITIONS

| Item                       | Symbol                                                        | Value   | Unit |
|----------------------------|---------------------------------------------------------------|---------|------|
| Ambient Temperature        | Ta                                                            | 25±2    | °C   |
| Ambient Humidity           | Ha                                                            | 50±10   | %RH  |
| Supply Voltage             | V <sub>CC</sub>                                               | 5.0     | V    |
| Input Signal               | According to typical value in "3. ELECTRICAL CHARACTERISTICS" |         |      |
| Inverter Current           | I <sub>L</sub>                                                | 7.0±0.5 | mA   |
| Inverter Driving Frequency | F <sub>L</sub>                                                | 55±5    | KHz  |
| Inverter                   | Darfon VK.13165.101                                           |         |      |

#### 3.2 OPTICAL SPECIFICATIONS

| Item               | Symbol               | Min.           | Typ.      | Max.  | Unit              | Note   |
|--------------------|----------------------|----------------|-----------|-------|-------------------|--------|
| Contrast Ratio     | CRn                  | -              | 1000      | -     | -                 |        |
| Luminance of White | L <sub>Ave</sub>     | 800            | 1000      | -     | cd/m <sup>2</sup> |        |
| Response Time      | τ <sub>DRV</sub>     | -              | 5         | -     | ms                |        |
| Chromaticity       | Red                  | R <sub>x</sub> | Typ.-0.03 | 0.633 | Typ.+0.03         | -      |
|                    |                      | R <sub>y</sub> |           | 0.351 |                   | -      |
|                    | Green                | G <sub>x</sub> |           | 0.329 |                   | -      |
|                    |                      | G <sub>y</sub> |           | 0.607 |                   | -      |
|                    | Blue                 | B <sub>x</sub> |           | 0.152 |                   | -      |
|                    |                      | B <sub>y</sub> |           | 0.066 |                   | -      |
|                    | White                | W <sub>x</sub> |           | 0.316 |                   | -      |
|                    |                      | W <sub>y</sub> |           | 0.341 |                   | -      |
| Viewing Angle      | x axis, right(φ=0°)  | θ <sub>r</sub> | -         | 85    | -                 | Degree |
|                    | x axis, left(φ=180°) | θ <sub>l</sub> | -         | 85    | -                 |        |
|                    | y axis, up(φ=90°)    | θ <sub>u</sub> | -         | 80    | -                 |        |
|                    | y axis, down (φ=0°)  | θ <sub>d</sub> | -         | 80    | -                 |        |

### 3.3 Flicker Adjustment

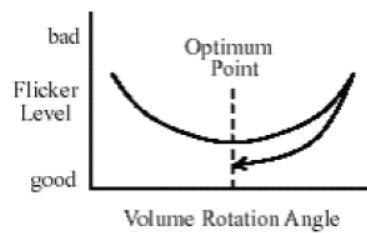
(1) Adjustment Pattern: 2H1V checker pattern as follows.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |
| R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B | R | G | B |



(2) Adjustment Method:

Flicker should be adjusted by turning the volume for flicker adjustment by the ceramic driver. It is adjusted to the point with least flickering of the whole screen. After making it surely overrun at once, it should be adjusted to the optimum point.

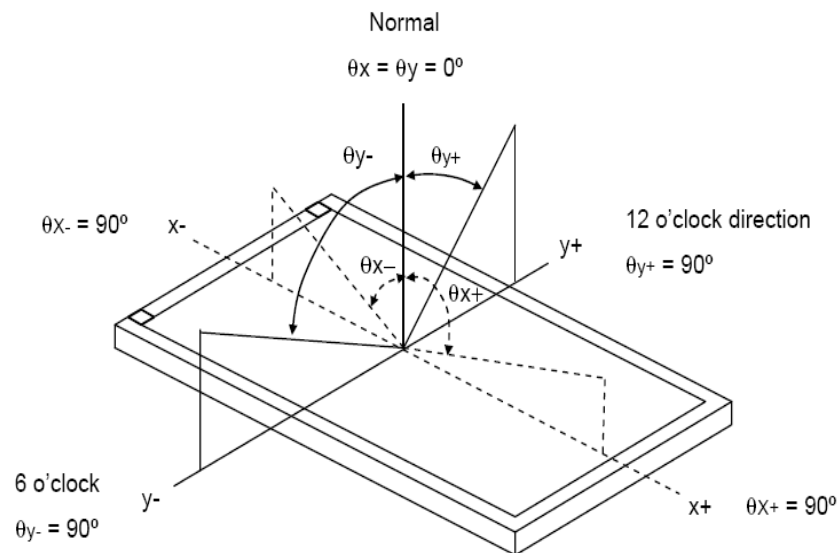


Note (0) Light source is the standard light source "C" which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following :

1. Measure Module's and BLU's spectrums. White is without signal input and R, G, B are with signal input. BLU(for M185B1-L01) is supplied by CMO.
2. Calculate cell's spectrum.
3. Calculate cell's chromaticity by using the spectrum of standard light source "C"

Note (1) Light source is the BLU which is supplied by CMO and driving voltages are based on suitable gamma voltages.

Note (2) Definition of Viewing Angle ( $\theta_x$ ,  $\theta_y$ ):



Note (3) : Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

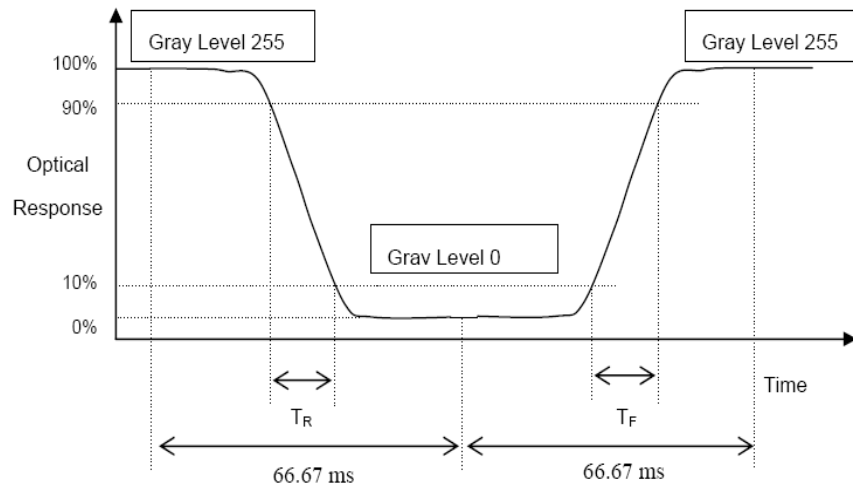
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

$$CR = CR (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (7).

Note (4) Definition of Response Time ( $T_R$ ,  $T_F$ ):



Note (5) Definition of Transmittance ( $T\%$ ):

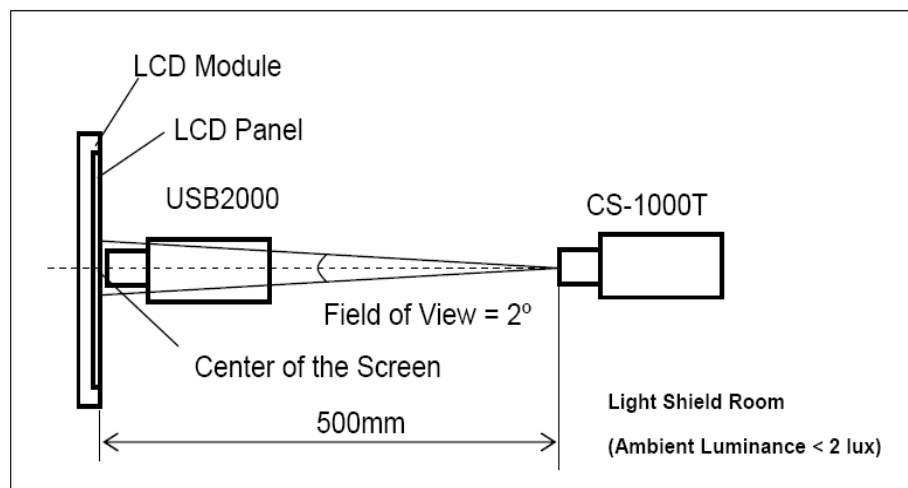
Module is without signal input.

$$\text{Transmittance} = \frac{\text{Luminance of LCD module } L(5)}{\text{Luminance of backlight } L_{BLU}(5)} * 100\%$$

$L(X)$  and  $L_{BLU}(X)$  is corresponding to the luminance of the point X at Figure in Note (7).

Note (6) Measurement Setup:

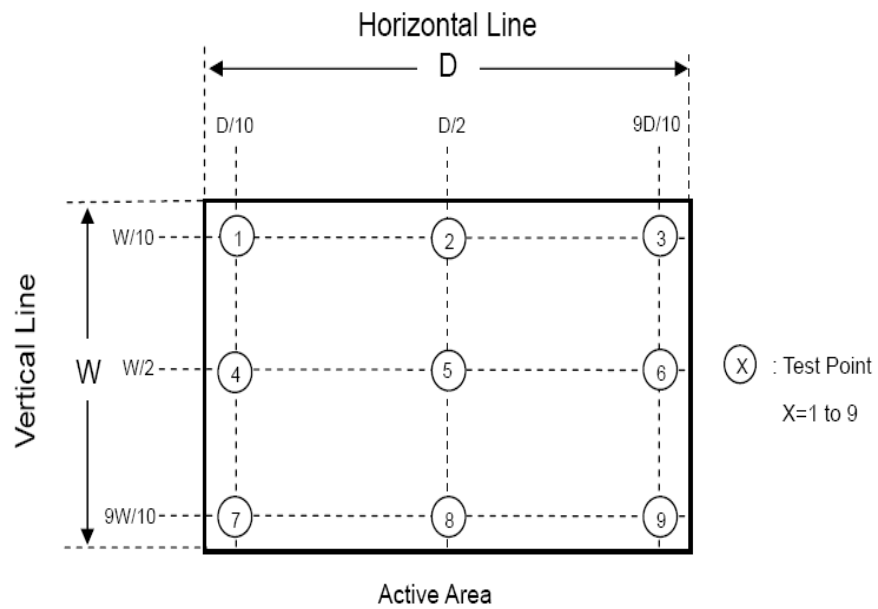
The LCD module should be stabilized at given temperature for 30minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30minutes in a windless room.



Note (7) : Definition of Transmittance Variation ( $\delta T\%$ ):

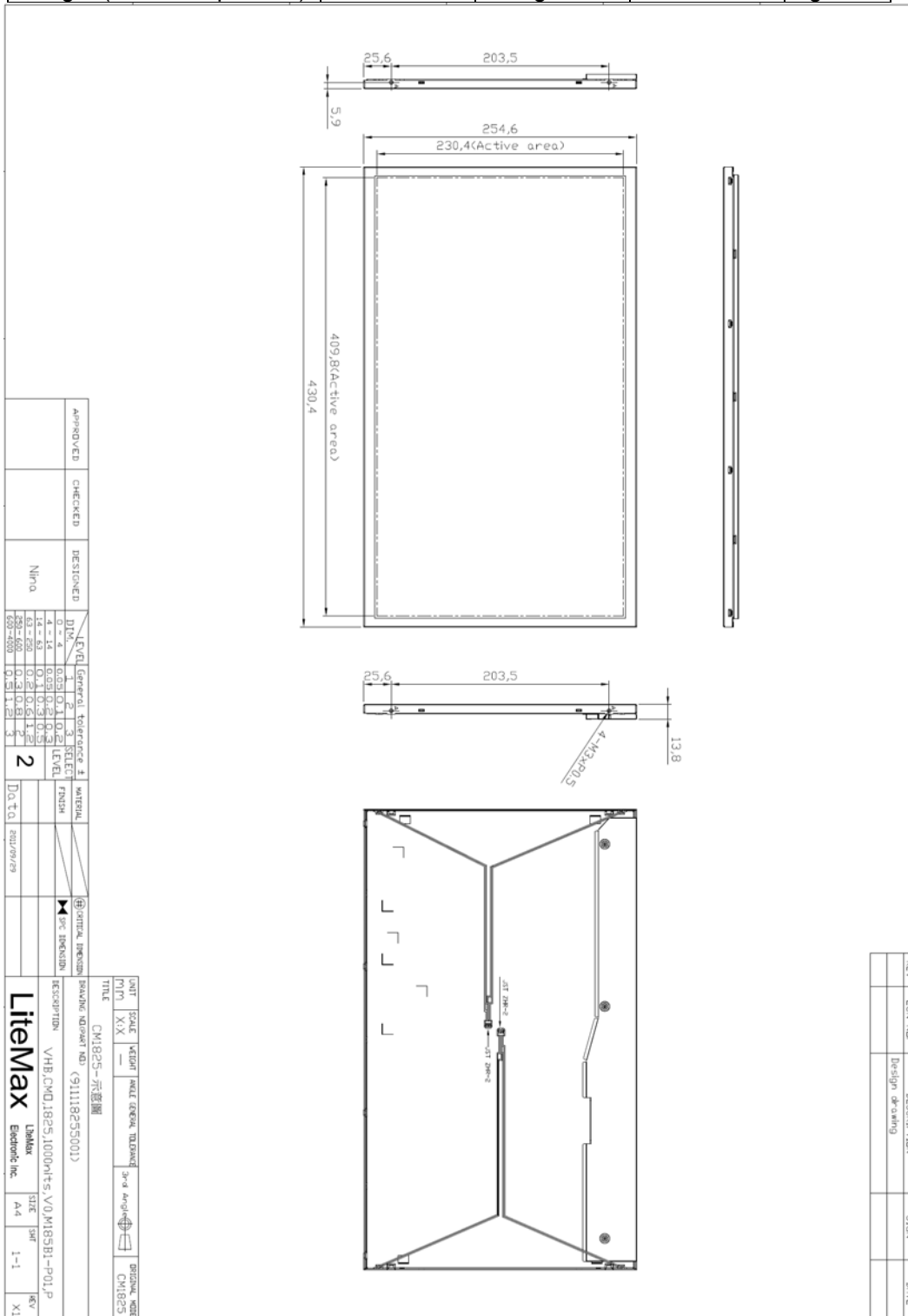
Measure the transmittance at 9 points

$$\delta T\% = \frac{\text{Maximum } [T\%(1), T\%(2), \dots T\%(9)]}{\text{Minimum } [T\%(1), T\%(2), \dots T\%(9)]}$$



## DLF/DLH1825 MECHANICAL SPECIFICATION

| Item                      |               | Min. | Typ.  | Max. | Unit |
|---------------------------|---------------|------|-------|------|------|
| Module Size               | Horizontal(H) | -    | 430.4 | -    | mm   |
|                           | Vertical(V)   | -    | 254.6 | -    | mm   |
|                           | Depth(D)      | -    | 13.8  | -    | mm   |
| Weight (Module only)      |               | -    | 1.6kg | -    | kg   |
| Weight (2 module per box) |               | -    | 3.5kg | -    | kg   |



## 5.0 PRECAUTIONS

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### 5.1 HANDLING PRECAUTIONS

- (1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
- (2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
- (3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
- (5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
- (6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
- (9) Do not disassemble the module.
- (10) Do not pull or fold the lamp wire.
- (11) Pins of I/F connector should not be touched directly with bare hands.

### 5.2 STORAGE PRECAUTIONS

- (1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
- (3) It may reduce the display quality if the ambient temperature is lower than 10 °C. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

### 5.3 OPERATION PRECAUTIONS

- (1) Do not pull the I/F connector in or out while the module is operating.
- (2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

## **6.0 AD2662GDVAR SPECIFICATIONS(DLH1825 only)**

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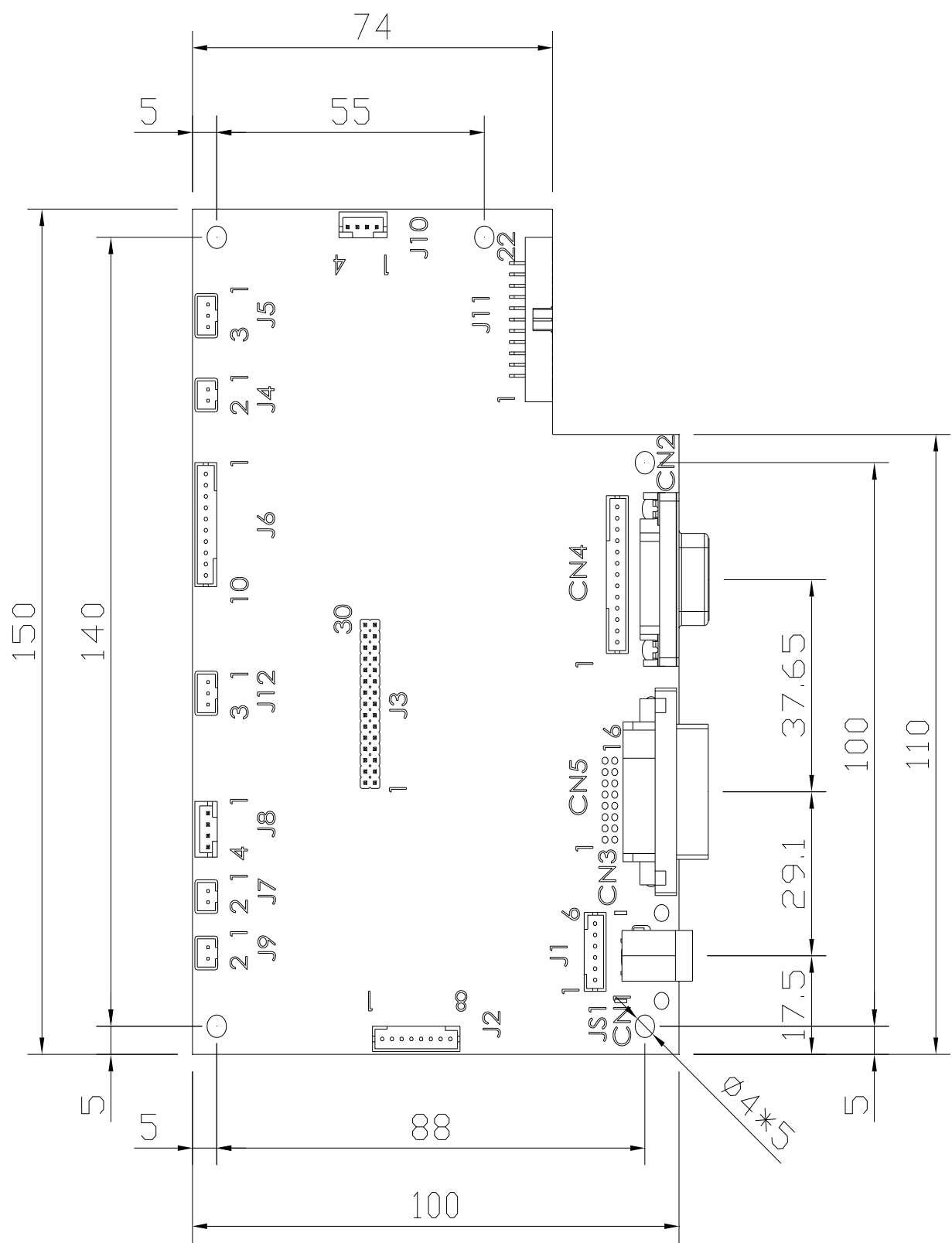
We developed this A/D board to support industrial high brightness and commercial applications. This A/D board has many functions. It has an external luminance sensor as an option, an optional VR button to control brightness, fan rotation and RS232. Rev.1 is European RoHS compliant.

### **6.1 General Description**

- Max Resolution Up To WUXGA
- Analog RGB Input up to 205MHz
- ULTRA-RELIABLE DVI INPUT
- Dual/single LVDS interface
- Support Panel DC5V or 3.3V, 12V Output
- External Fan Control by Software
- OSD Control
- Inverter Analog or PWM Dimming Control
- \*External V.R. brightness control (optional)
- \*External light sensor brightness control (optional)
- \*External RS232 control (optional)
- Input Power 12V DC
- CBVS, S-VIDEO, \*\*YCbCr (optional) INPUT
- Audio in and b2Wx2 Audio Out(optional)
- IR Remove control

6.2 Outline Dimensions

AD2662GD 150mmX100mmX20mm



Technical drawing of a PCB layout showing dimensions and component labels. The drawing includes a top view with dimensions in millimeters (mm) and a side view showing component heights.

**Dimensions (mm):**

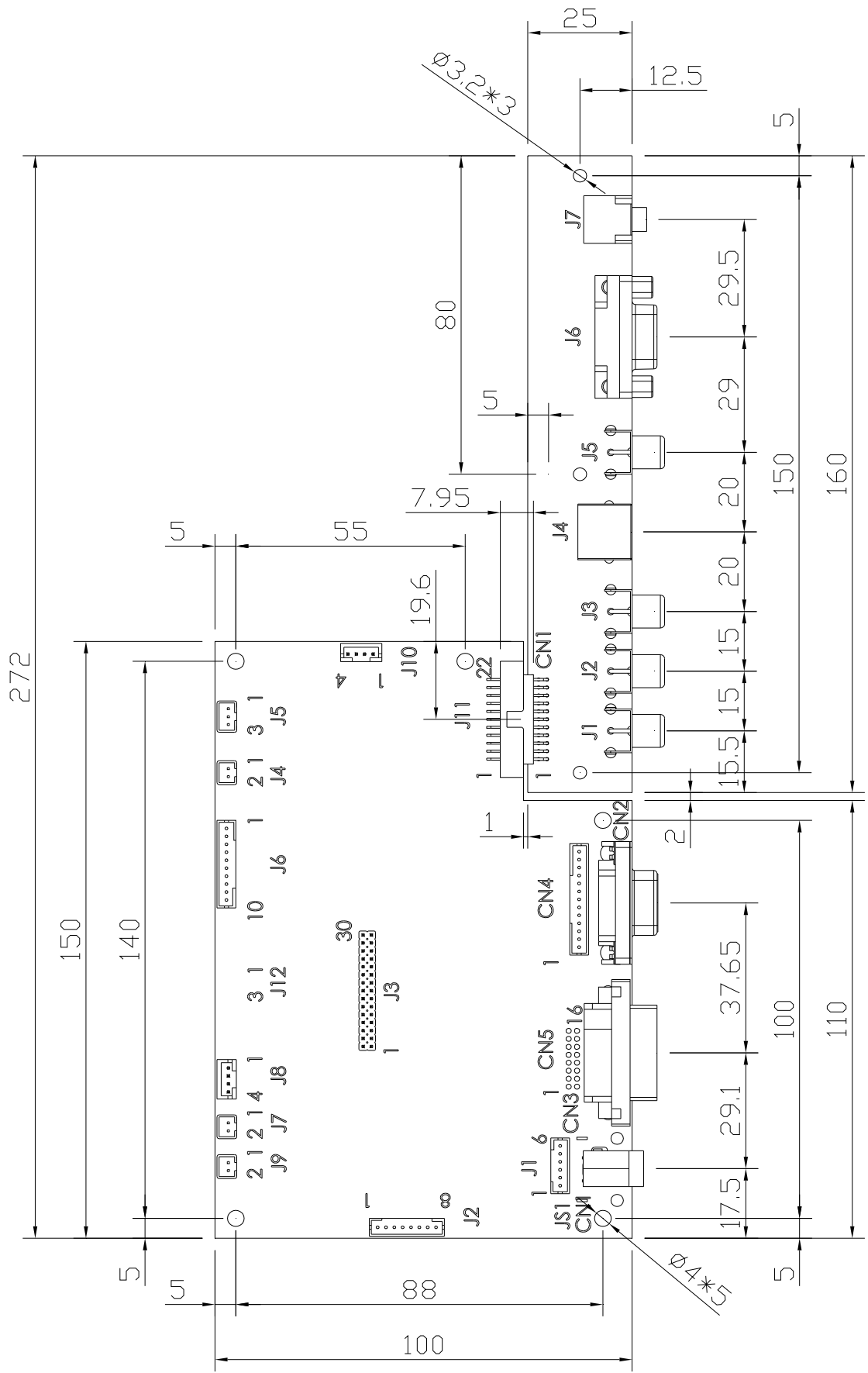
- Overall width: 160
- Overall height: 150
- Distance from top edge to component J1: 5
- Distance from top edge to component J2: 12.5
- Distance from top edge to component J3: 18.4
- Distance from top edge to component J4: 80
- Distance from top edge to component J5: 150
- Distance from top edge to component J6: 150
- Distance from top edge to component J7: 160
- Distance from left edge to component J1: 15.5
- Distance from left edge to component J2: 15
- Distance from left edge to component J3: 15
- Distance from left edge to component J4: 20
- Distance from left edge to component J5: 20
- Distance from left edge to component J6: 29
- Distance from left edge to component J7: 29.5

**Component Labels:**

- J1, J2, J3, J4, J5, J6, J7
- CN1
- U1
- U2
- U3
- U4
- U5
- U6
- U7
- U8
- U9
- U10
- U11
- U12
- U13
- U14
- U15
- U16
- U17
- U18
- U19
- U20
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- U90
- U91
- U92
- U93
- U94
- U95
- U96
- U97
- U98
- U99
- U100

**Notes:**

- Ø 3.2 \* 3 (hole diameter and length)
- U1, U2, U3, U4, U5, U6, U7, U8, U9, U10, U11, U12, U13, U14, U15, U16, U17, U18, U19, U20, U21, U22, U23, U24, U25, U26, U27, U28, U29, U30, U31, U32, U33, U34, U35, U36, U37, U38, U39, U40, U41, U42, U43, U44, U45, U46, U47, U48, U49, U50, U51, U52, U53, U54, U55, U56, U57, U58, U59, U60, U61, U62, U63, U64, U65, U66, U67, U68, U69, U70, U71, U72, U73, U74, U75, U76, U77, U78, U79, U80, U81, U82, U83, U84, U85, U86, U87, U88, U89, U90, U91, U92, U93, U94, U95, U96, U97, U98, U99, U100



### 6.3 AD2662 Board Pin Define

**J3:** Panel connector

| Pin No. | Function | Pin No. | Function  |
|---------|----------|---------|-----------|
| 1       | RxO0+    | 16      | RxE1-     |
| 2       | RxO0-    | 17      | RxE2+     |
| 3       | RxO1+    | 18      | RxE2-     |
| 4       | RxO1-    | 19      | RxEC+     |
| 5       | RxO2+    | 20      | RxEC-     |
| 6       | RxO2-    | 21      | RxE3+     |
| 7       | RxOC+    | 22      | RxE3-     |
| 8       | RxOC-    | 23      | GND       |
| 9       | RxO3+    | 24      | GND       |
| 10      | RxO3-    | 25      | GND       |
| 11      | GND      | 26      | GND       |
| 12      | GND      | 27      | GND       |
| 13      | RxE0+    | 28      | PANEL-VCC |
| 14      | RxE0-    | 29      | PANEL-VCC |
| 15      | RxE1+    | 30      | PANEL-VCC |

**CN3:** DVI-D INPUT Connector

| Pin No. | Function                   | Pin No. | Function                   | Pin No. | Function                   |
|---------|----------------------------|---------|----------------------------|---------|----------------------------|
| 1       | T.M.D.S. Data2-            | 9       | T.M.D.S. Data1-            | 17      | T.M.D.S. Data0-            |
| 2       | T.M.D.S. Data2+            | 10      | T.M.D.S. Data1+            | 18      | T.M.D.S. Data0+            |
| 3       | T.M.D.S. Data2/4<br>Shield | 11      | T.M.D.S. Data1/3<br>Shield | 19      | T.M.D.S. Data0/5<br>Shield |
| 4       | T.M.D.S. Data4-            | 12      | T.M.D.S. Data3-            | 20      | T.M.D.S. Data5-            |
| 5       | T.M.D.S. Data4+            | 13      | T.M.D.S. Data3+            | 21      | T.M.D.S. Data5+            |
| 6       | DDC Clock                  | 14      | +5V Power                  | 22      | T.M.D.S. Clock<br>Shield   |
| 7       | DDC Data                   | 15      | Ground<br>(for +5V)        | 23      | T.M.D.S. Clock+            |
| 8       | Not Connected              | 16      | Hot Plug Detect            | 24      | T.M.D.S. Clock-            |

**CN5:** DVI-D Connector (16pin 2.0mm)

| Pin No. | Function | Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|---------|----------|
| 1       | RX2-     | 7       | DDC_SDA  | 13      | GND      |
| 2       | RX2+     | 8       | DDC_SCL  | 14      | GND      |
| 3       | RX1-     | 9       | GND      | 15      | DVI HP   |
| 4       | RX1+     | 10      | GND      | 16      | DVI_5V   |
| 5       | RX0-     | 11      | RXC-     |         |          |
| 6       | RX0+     | 12      | RXC+     |         |          |

**CN2:** Analog RGB Input connector (D-SUB 15Pin)

| Pin No. | Symbol    | Description  | Pin No. | Symbol | Description     |
|---------|-----------|--------------|---------|--------|-----------------|
| 1       | RED       | Analog Red   | 9       | +5V    | +5VDDC          |
| 2       | GREEN     | Analog Green | 10      | SGND   | Sync GND        |
| 3       | BLUE      | Analog Blue  | 11      | NCD    | Reserved        |
| 4       | GND       | Reserved     | 12      | SDA    | DDC Serial Data |
| 5       | NC        | VGA_CAB      | 13      | HSYNC  | Horizontal Sync |
| 6       | RED_RTN   | Red Return   | 14      | VSNC   | Vertical Sync   |
| 7       | GREEN_RTN | Green Return | 15      | SCL    | DDC Data Clock  |
| 8       | BLUE_RTN  | Blue Return  |         |        |                 |

**CN4:** Analog RGB Input connector (13pin connector)

| Pin No. | Symbol | Description     | Pin No. | Symbol | Description  |
|---------|--------|-----------------|---------|--------|--------------|
| 1       | SCL    | DDC Data Clock  | 8       | BGND   | Blue Return  |
| 2       | SDA    | DDC Serial Data | 9       | BLUE   | Analog Blue  |
| 3       | GND    | Reserved        | 10      | GGND   | Green Return |
| 4       | +5V    | +5VDDC          | 11      | GREEN  | Analog Green |
| 5       | GND    | Reserved        | 12      | RGND   | Red Return   |
| 6       | VSNC   | Vertical Sync   | 13      | RED    | Analog Red   |
| 7       | HSYNC  | Horizontal Sync |         |        |              |

**JS1:** Power DIN(12V)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | 12VDC    | 2       | 12VDC    |
| 3       | GND      | 4       | GND      |

**JS1:** Power Jack (12V)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | 12VDC    | 2       | 12VDC    |

**J1:** Power connector (12V) (6PIN 2.0mm)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | 12VDC    | 4       | GND      |
| 2       | 12VDC    | 5       | GND      |
| 3       | 12VDC    | 6       | GND      |

**J8:** Power connector (5V/12v)(4PIN 2.0mm)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | 5VDC     | 2       | GND      |
| 3       | 12VDC    | 4       | GND      |

**J2:** Inverter Connector(8PIN 2.0mm)

| Pin No. | Symbol | Description      | Pin No. | Symbol | Description |
|---------|--------|------------------|---------|--------|-------------|
| 1       | ON/OFF | Backlight ON/OFF | 5       | GND    | GND         |
| 2       | BRIGHT | Dimming adjust   | 6       | 12VDC  | Input 12VDC |
| 3       | GND    | GND              | 7       | 12VDC  | Input 12VDC |
| 4       | GND    | GND              | 8       | 12VDC  | Input 12VDC |

**J7, J9:** FAN (2PIN 2.0mm)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | FAN(+)   | 2       | GND      |

**J6:** Key Pad (9PIN 2.0mm)

| Pin No. | Function  | Pin No. | Function |
|---------|-----------|---------|----------|
| 1       | POWER KEY | 6       | MENU KEY |
| 2       | GREEN LED | 7       | AUTO KEY |
| 3       | RED LED   | 8       | GND      |
| 4       | DOWN KEY  | 9       | GND      |
| 5       | UP KEY    |         |          |

**J10:** Speaker Connector (4PIN 2.0mm)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | SPK-R    | 2       | GND      |
| 3       | GND      | 4       | SPK-L    |

**J11** Extern Funtion Connector (11P X 2PIN 2.0mm)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | Pb       | 2       | Y        |
| 3       | GND      | 4       | Pr       |
| 5       | GND      | 6       | SY       |
| 7       | GND      | 8       | SC       |
| 9       | GND      | 10      | AV       |
| 11      | GND      | 12      | GND      |
| 13      | TXD      | 14      | RXD      |
| 15      | GND      | 16      | GND      |
| 17      | GND      | 18      | GND      |
| 19      | Audio-L  | 20      | Audio-R  |
| 21      | GND      | 22      | GND      |

**J5:** Ambient (3PIN 2.0mm)

| Pin No. | Function | Pin No. | Function   |
|---------|----------|---------|------------|
| 1       | 3.3VDC   | 2       | Sensor Out |

**J4:** VR connector (3PIN 2.0mm)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | 3,3VDC   | 2       | VR Out   |
| 3       | GND      |         |          |

**J12:** IR Connector(3PIN 2.0mm)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | IR Out   | 3       | 3.3VDC   |
| 2       | GND      | 4       |          |

**JP1:** PANEL VCC (3PIN 2.54mm)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1-2     | 12V      | 5-6     | 3.3V     |
| 3-4     | 5V       |         |          |

## 6.4 I/O BOARD Pin Define

### J1:Component Y

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | Y        | 2       | GND      |

### J2:Component Cb

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | Cb       | 2       | GND      |

### J3:Component Cr

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | Cr       | 2       | GND      |

### J4:S-Video

| Pin No. | Function  | Pin No. | Function    |
|---------|-----------|---------|-------------|
| 1       | GND       | 2       | GND         |
| 3       | Luminance | 4       | Chrominance |

### J5:Composite

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | Y        | 2       | GND      |

### J6:D-SUB9(RS232)

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | NC       | 2       | TXD      |
| 3       | RXD      | 4       | NC       |
| 5       | GND      | 6       | NC       |
| 7       | NC       | 8       | NC       |
| 9       | NC       |         |          |

### CN1:11P X 2 Connector

| Pin No. | Function     | Pin No. | Function     |
|---------|--------------|---------|--------------|
| 1       | Component Cb | 2       | Component Y  |
| 3       | GND          | 4       | Component Cr |
| 5       | GND          | 6       | S-Video Y    |
| 7       | GND          | 8       | S-Video C    |
| 9       | GND          | 10      | Composite    |
| 11      | GND          | 12      | GND          |
| 13      | TXD          | 14      | RXD          |
| 15      | GND          | 16      | GND          |
| 17      | GND          | 18      | GND          |
| 19      | Audio IN(L)  | 20      | Audio IN(R)  |

## 6.5 IR Receive Board Pin Define

**J1:** IR Connector

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | DATA OUT | 2       | GND      |
| 3       | VCC      | 4       | NC       |

## 6.6 DC Characteristics.

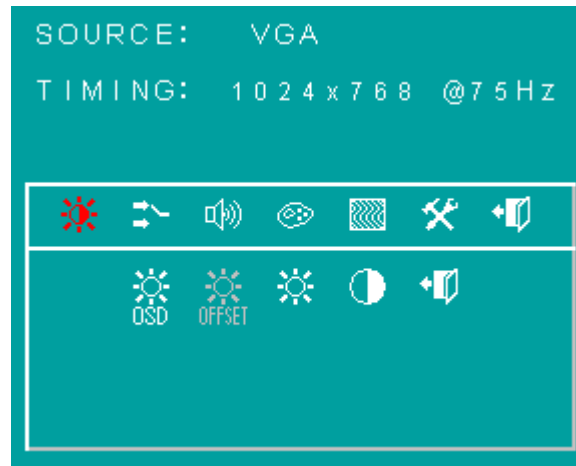
|                       |        |       |
|-----------------------|--------|-------|
| Power Consumption     | 10W    | Note1 |
| Operation Temperature | 0~70   | °C    |
| Storage Temperature   | -20~85 | °C    |

Note: These values are for the A/D board body.

## 6.7 OSD menu

Here are some instructions for you to use the OSD (On Screen Display). By pressing the “menu”, you will see the below picture.

Timing shows resolution, H-frequency, and V-frequency of the panel. Version shows the firmware control version. This 2 information is not changeable by user.



There are 7 sub pages inside the OSD manual, Brightness, Signal select, Sound, Color, Image, Tools, and Exit.

When you press “menu” button, you enter the “Brightness” sub page. You will see 5 selections:



press “menu”



press “menu”



press “menu”



### OSD Brightness:



press “right” key



press “menu” once, you can go into adjust the brightness. Press “left” you can dim down the brightness to “0”, while press “right” you can increase the brightness to “100”.



**Ambient light sensor:** press this Icon, must to accompany with Litemax ambient light sensor to auto dimming.(OPTION)



**Potentiometer:** press this icon, adjust VR function.(OPTION)



**Ambient light sensor with OSD offset:** press this Icon



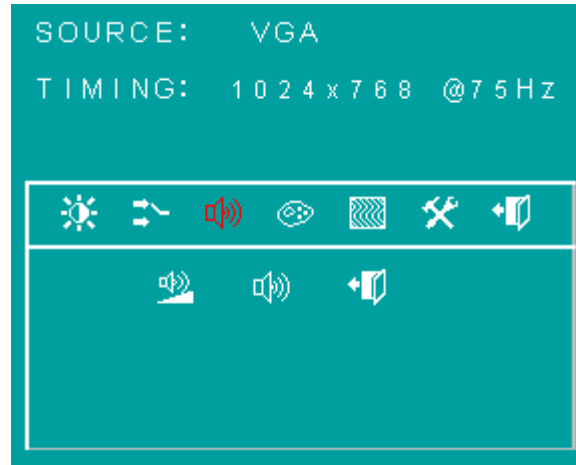
Press ‘menu’ once, you can adjust min. luminance to fit your application (OPTION)



**Contrast:** Press “menu” and “right” you can adjust the contrast from “0” to “100” by pressing the “left” and “right”.

**Exit:** You can exit this sub menu back to normal screen.

## Sound :



There are 3 options for “Sound” sub page.



**Audio Volume:** Audio volume adjustment.



**Mute:** You can mute the speaker by pressing this option.



**Exit:** back to the normal screen.



**Auto Color:** by press this “Auto Color” option, you can get the optimal color performance.



**sRGB:** Windows standard color setting.



**Color Tempture:** You can have 3 options in this selection.



**Color Tempture User**



**Color Tempture\_6500K**



**Color Tempture\_9300K**

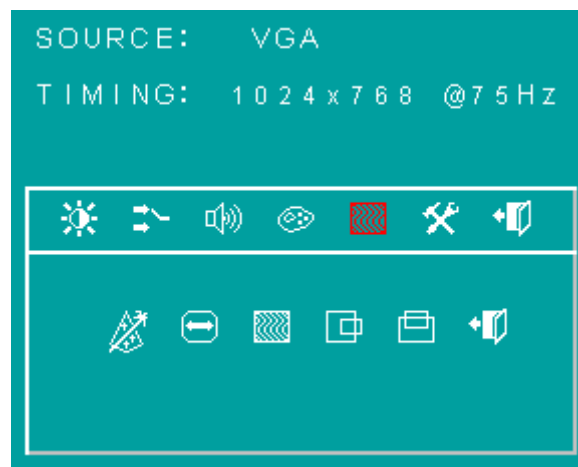
“user mode”, “6500K” (Warm color scheme), “9300K (Cold color scheme).  
Def ault is “user”, and inside all “R”, “G”, and “B” are set “100”



**Exit:** back to the normal screen.

### Image :

Go into the “Image” page, you can see below picture.





**Auto just:** Pressing this option, the AD5621 will adjust the optimal frequency of horizontal and vertical. You will see “Auto tune....” On the screen for around 3 seconds.



**Clock:** If you are not satisfied about the Autotune result, you can adjust manually by “Clock”.

The screen will be “wider” if you adjust this function.



**Phase:** If you see “double image” on characters, you can adjust “Phase” to make it perfect image.



**HPos:** You can shift the screen horizontally by this function.



**Vpos:** You can shift the screen vertically by this function.



**Exit:** Back to normal screen.

## TOOLS :

On the “Tools” sub menu, you will see 4 icons.



**Osd Control:** Select this option, you will see 4 more options:





**Osd\_time:** You can selection the time of OSD from 2 sec. to 16 sec.



**Osd\_HPos:** You can move the OSD horizontally over the screen.



**Osd\_VPos:** You can move the OSD Vertically over the screen.



**Exit:** back to main menu.



**Factory\_Reset:** By pressing this, the screen will be back to the factory setting on very beginning and lost all the personal settings.



**Sharpness:** You can make the characters looks sharper.



**Exit**

## BURNIN MODE :

Factory Burn-in mode: While your VGA cable is connected on the monitor, press “Menu” and Left and Right <” simultaneously, you will see “BURN IN MODE” on the center of the screen for 3 sec. Then unplug the VGA cable, the screen will show Red, Green, Blue, White, and Black in sequence automatically.

You can plug in the VGA signal cable, and re-plug the power connector to exit the burn-in mode.

## KEY LOCK MODE :

OSD Lock Function: It is possible to lock all the OSD buttons to prevent unauthorized changes to occur by pressing “Menu” and “right >” buttons simultaneously. You will see the “lock” icon below on the center of the screen for 3 seconds. If any button is pushed after the lock function is initiated, the below icon will appear on the screen.'



To release the OSD lock, press “Menu” and “Right >”. The below icon will appear on the center of the screen for 3 seconds. Now all OSD keys are active again.

